REMARKS

In response to the Final Office Action dated October 20, 2004, the Applicant submits this Reply. In view of the foregoing amendments and following remarks, reconsideration is requested.

Claims 1-14 and 17-18 remain in this application, of which claims 1 and 8 are independent. Claims 17 and 18 are new. No fee is due for claims for this amendment.

Rejections Under 35 U.S.C. §103

Claims 1, 2, 4, 8, 9 and 11, of which claims 1 and 8 are independent, were rejected under 35 U.S.C. §103(e) in view of U.S. Patent 6,477,279 ("Go") and U.S. Patent 6,628,715 ("Iu"). Dependent claims 3, 10 and 14 were rejected under 35 U.S.C. §103 in view of Go, Iu and U.S. Patent Publication 2002/0159749A1 ("Kobilansky"). Dependent claims 5 and 12 were rejected under 35 U.S.C. §103 in view of Go, Iu and U.S. Patent 4,924,310 ("Von Brandt"). Dependent claim 7 was rejected under 35 U.S.C. §103 in view of Go, Iu, Von Brandt and Kobilansky. These rejections are respectfully traversed.

According to Go, an image is encoded by "detecting edges in the image, and encoding the position and sharpness of the detected edges, filtering the image by a low-pass filter to generate a low frequency image, and encode the low frequency image." See *Go*, Abstract. As part of this encoding, an input image is processed using horizontal and vertical edge detectors to produce two "edge images" (Sh and Sv). See *Go*, Col. 7, lines 4-37 and Col. 12, line 66 to Col. 13, line 2. In one embodiment of the encoder, adapted for moving images, the pair of edge images for two consecutive images are subjected to motion estimation. See *Go*, Col 16, lines 59-61, and Col. 17, lines 5-20. Motion is estimated using "block matching," as described from Col. 17, line 63, to Col. 19, line 5. The block matching process is carried out separately on the horizontal and vertical edge images. See, *Go*, Col. 18, lines 24-26. As noted in the Final Office Action, this block matching process is not based on a "constraint that a total of the desired characteristic is constant from one image to a next image," as claimed.

According to Iu, in the portion cited by the Office Action, a paper by Horn and Schunck describes a technique for estimating motion vectors called "optical flow." See *Iu*, Col. 2, lines 16-21. In an optical flow computation, "motion vectors are estimated by minimizing the error of

a motion constraint equation and the error of motion smoothness over the entire image." *Iu*, Col. 2, lines 21-24. This "motion constraint equation is derived from the assumption that the image intensity is constant along the motion trajectory." *Iu*, Col. 2, lines 22-26. *Iu* also criticizes this optical flow formulation by saying "it has long been neglected that this constraint is correct only in an infinitesimal neighborhood around the observation point." *Iu*, Col. 2, lines 37-39.

The Office Action asserts that Iu:

> "discloses a 'motion constraint equation' which is using the constraint that the image gradient (i.e. the 'edge strength' value, which is the desired characteristic between the two images) is constant from one image to the next."

Final Office Action, page 4, lines 5-7. As is clear from the above excerpts from Iu, Iu does not teach what the Office Action asserts. Iu states that it is the image intensity (i.e., the luminance) that is constant along the motion trajectory, not just any desired characteristic. Iu does not mention edge strength in the portion relied upon by the Office Action. Iu neither teaches nor suggests that any characteristic of any image, other than luminance, may be constant from one image to the next.

The Office Action concludes that the edge images Sh and Sv of Go would be subjected to the motion constraint equation mentioned in Iu to allow for "a high performance method that was easy to implement," citing Iu at Col. 2, lines 35-36 (which states "This example is probably the most popular method due to its simplicity and reasonable performance"). This recognition in Iu (that the optical flow method of Horn and Schunck is popular because of its simplicity and reasonable performance) is neither a teaching nor a suggestion that either a. the optical flow technique should be modified to be based on an assumption that edges, or any other characteristic other than luminance, is constant from one image to the next, or that b. the optical flow technique should be applied to two edge images such as generated by the encoding method described by Go, in lieu of Go's block matching technique. There is no other evidence relied upon in the Final Office Action that supports a finding that there is a teaching or suggestion from the prior art to make such a modification to Go. There also is no evidence relied upon in the Final Office Action to support a finding that one of ordinary skill in the art would have recognized any reasonable likelihood of success in applying optical flow techniques to edge images.

Because the evidence relied upon in the Final Office fails to support a finding that one of ordinary skill in the art would have combined the teachings of Iu and Go in the manner suggested in the Office Action, the rejection of independent claims 1 and 8 is traversed.

Accordingly, claims 1 and 8 are patentable over Go. The remaining claims 2-7 and 9-14 are dependent claims that are allowable for at least the same reasons.

Regarding the dependent claims 3, 7, 10 and 14, these claims are also allowable for the following additional reasons.

Kobilansky only teaches, at best, that motion estimation should take into account the proximity to a color. In particular, in paragraph [0015], Kobilansky teaches a motion estimating technique that computes displacement vectors for regions in an image, ensuring that a "region r of a reference image is reasonably well mapped to a region r+d(r) of a target frame." Kobilansky merely says that the "region r+d(r) in target frame should have image properties like . . . color close to those of the region r in the reference frame." Kobilansky does not teach generating a single channel image based on a desired characteristic where that desired characteristic is color proximity. None of the evidence relied upon in the Final Office Action supports such a finding. Moreover, there is no evidence to support a finding that Kobilansky teaches or suggests any modification to Go that could replace Go's horizontal and vertical edge images with some calculation (not taught by Kobilansky) of color proximity.

Accordingly, claims 3, 7, 10 and 14 are distinguishing over Go, Iu, Von Brandt and Kobilanksy.

NEW CLAIMS

Claims 17 and 18 have been added to indicate that the "gradient-based method" of claims 1 and 8 comprises "computing optical flow". Whereas the Final Office Action asserted that Go teaches a "gradient based method" by computing a difference between images, the language of claims 17 and 18 is clearly distinguished from Go. These claims are dependent claims and thus are allowable for the same reasons and the independent claims 1 and 8.

CONCLUSION

In view of the foregoing amendments and remarks, this application should now be in condition for allowance. A notice to this effect is respectfully requested. If the Examiner believes, after this reply, that the application is not in condition for allowance, the Examiner is requested to call the Applicants' attorney at the telephone number listed below.

If this response is not considered timely filed and if a request for an extension of time is otherwise absent, Applicants hereby request any necessary extension of time. If there is a fee occasioned by this response, including an extension fee, please charge any fee to **Deposit Account No. 50-0876.**

Respectfully submitted,

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